TOTAL MAXIMUM DAILY LOAD (TMDL)

For The Pesticide Fipronil in the Mermentau River Basin

SUMMARY TABLE

Louisiana Standards Segment	Subsegments in Mermentau Basin
Parameter of Concern	Pesticides (fipronil)
Uses Affected	Mermentau: propagation of fish and wildlife
Geographic Location	Mermentau: Southwestern Louisiana
Size of Watershed	Mermentau: 10,002.76 km^2
Land Type	flatwoods, prairie, mixed hardwoods, marshland
Land Use/Cover	Mermentau: Agriculture (52.3%), Forest (8.4%), Wetlands (25.7%), Water (11.9%), Urban (1.3%), Other (0.4%)
Identified sources	Rice farming activities
TMDL for: Fipronil	LA = variable depending upon flow (based on a representative flow for the major drainage(s) and concentration of 2.3 ug/l for freshwater. In addition to the TMDL values, no introduction of fipronil, which causes local concentrations to be greater than the numeric target, will be authorized. WLA = 0

TOTAL MAXIMUM DAILY LOAD (TMDL)

For the Pesticide Fipronil
in the Mermentau Basin for the Following Subsegments:
Bayou Plaquemine Brule (050201)
Mermentau River (050401)
Bayou Queue de Tortue (050501)
Bayou Chene (050603)
Including the 303(d) Listed Subsegment
Bayou Des Cannes (050101)

US EPA Region 6

March 21, 2002

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Executive Summary

One stream subsegment in the Mermentau River Basin is listed for pesticides on the 1999 court-ordered 303(d) list for Louisiana. During data analysis, four additional subsegments in the Mermentau River Basin were identified as impaired due to the pesticide fipronil. A watershed approach was used in developing this Total Maximum Daily Load (TMDL). This approach is most appropriate when addressing predominately nonpoint source issues such as pesticides where inputs are distributed throughout the watershed.

This TMDL establishes watershed level controls for four newly identified subsegments and one 303(d) listed subsegment in the Mermentau River Basin. Pesticide target values for numerous currently used pesticides have been calculated. These numeric targets are not the same as a water quality standard, but a numeric value that represents the Environmental Protection Agency's (EPAs) interpretation of Louisiana's water quality narrative standard for toxics as it applies to pesticides. EPA calculated this numeric target in accordance with procedures outlined in the State of Louisiana Water Quality Standards for toxics and supporting documentation submitted to EPA Region 6. Available pesticides data has been screened against these target values, with fipronil meeting the criteria for partial or non-support.

Fipronil is a phenylpyrazole insectide especially effective in controlling the rice weevil. It came into use in Louisiana rice farming in 1999, after carbofuran was banned from use. Fipronil use in Louisiana rice farming is controversial because crawfish production has declined. Past studies have been inconclusive in determining the strength of the relationship between crawfish toxicity and fipronil. As a precaution, Aventis and LDAF issued use restrictions to address the problem. New studies are currently underway to further evaluate the use of fipronil in rice farming.

This TMDL is based on an EPA developed numeric target appropriate for freshwater (2.3 ug/). It is assumed that the five subsegments have no assimilative capacity for fipronil loading at concentrations above the numeric targets for freshwaters. The wasteload (WLA) and load allocation (LA) cumulatively for the Mermentau River Basin should not cause or contribute to exceedances of these numeric targets. Attainment of the narrative objective for toxicity and protection of the freshwater habitat and wildlife habitat beneficial uses for these subsegments is expected given the application of use restrictions issued by Aventis and LDAF. In addition to the TMDL values, no introduction of fipronil, which causes local concentrations to be greater than the numeric target, will be authorized.

List of Abbreviations

CFR	Code of Federal Regulations
CWA	Clean Water Act
EPA	Environmental Protection Agency
LA	Load Allocation
LC_{50}	Concentration at which 50% of the test organisms die
LDAF	Louisiana Department of Agriculture and Forestry
LDEQ	Louisiana Department of Environmental Quality
MCL	Maximum Contaminant Level
MOS	Margin of Safety
TMDL	Total Maximum Daily Load
ug/L	Micrograms Per Liter
WLA	Wasteload Allocation

1.0 Introduction

Section 303(d) of the Clean Water Act (CWA) as amended by the Water Quality Act of 1987, and EPA's regulations at 40 CFR 130 require that each state identify those waters within its boundaries not meeting water quality standards. Section 303(d) of the CWA further requires that states develop TMDL management plans for water bodies determined to be water quality limited. A TMDL documents the amount of a pollutant a water body can assimilate without violating the State's water quality standards. It also allocates that load capacity to known point sources and nonpoint sources. TMDLs are defined in 40 CFR Part 130 as the sum of the individual Waste Load Allocations (WLAs) for point sources and Load Allocations (LAs) for nonpoint sources, including a margin of safety (MOS) and natural background conditions.

2.0 Study Area Description

2.1 General Information

The Mermentau River Basin, located in southwestern Louisiana, encompasses the prairie region of the state and a section of the coastal zone (Figure 1). The Mermentau River Basin is bounded on the north and east by the Vermilion-Teche River Basin, on the west by the Calcasieu River Basin and on the south by the Gulf of Mexico (LDEQ 1996).

The northern part of the basin is upland area dominated by flat woods and prairie. Large expanses of flat grassland and scattered areas of oak trees and other mixed hardwoods characterize the prairie region. The southern portion of the basin, the coastal area, is marshland. The slope of the land is generally north to south. Poor drainage and annual backwater flooding of agricultural lands characterize the region, especially in the prairie and marsh areas, due to its relatively low relief.

The Mermentau Basin is sparsely populated outside its small municipalities and land use is dominated by silviculture and agriculture in the upper half of the watershed and by agriculture in the lower half. Of the approximately 600,000 acres statewide planted in rice annually, 280,000 acres or 46% are attributed to the Mermentau River Basin (personal communication with Butch Stegall of LDAF). Land uses for the Mermentau River Basin, summarized in Table 1, were derived from 1995 satellite interpreted National Land Cover Data (NLCD) produced as part of a cooperative project between the U. S. Geological Survey (USGS) and the U.S. Environmental Protection Agency (USEPA).

2.2 Problem Statement

Bayou Des Cannes (Subsegment 050101) in the Mermentau River Basin was included on the 1999 court-ordered Louisiana 303(d) list as not fully supporting the water quality standard with "pesticides" listed as the cause of nonsupport. The original assessment was based largely on the best professional judgment of Louisiana Department of Environmental Quality (LDEQ) regional coordinators, often without the benefit of quantitative data. A possible rationale for this listing is the fact that since the predominant land use is agriculture, then the possibility for pesticide impairment in the subsegment existed. This is further supported by the fact that no

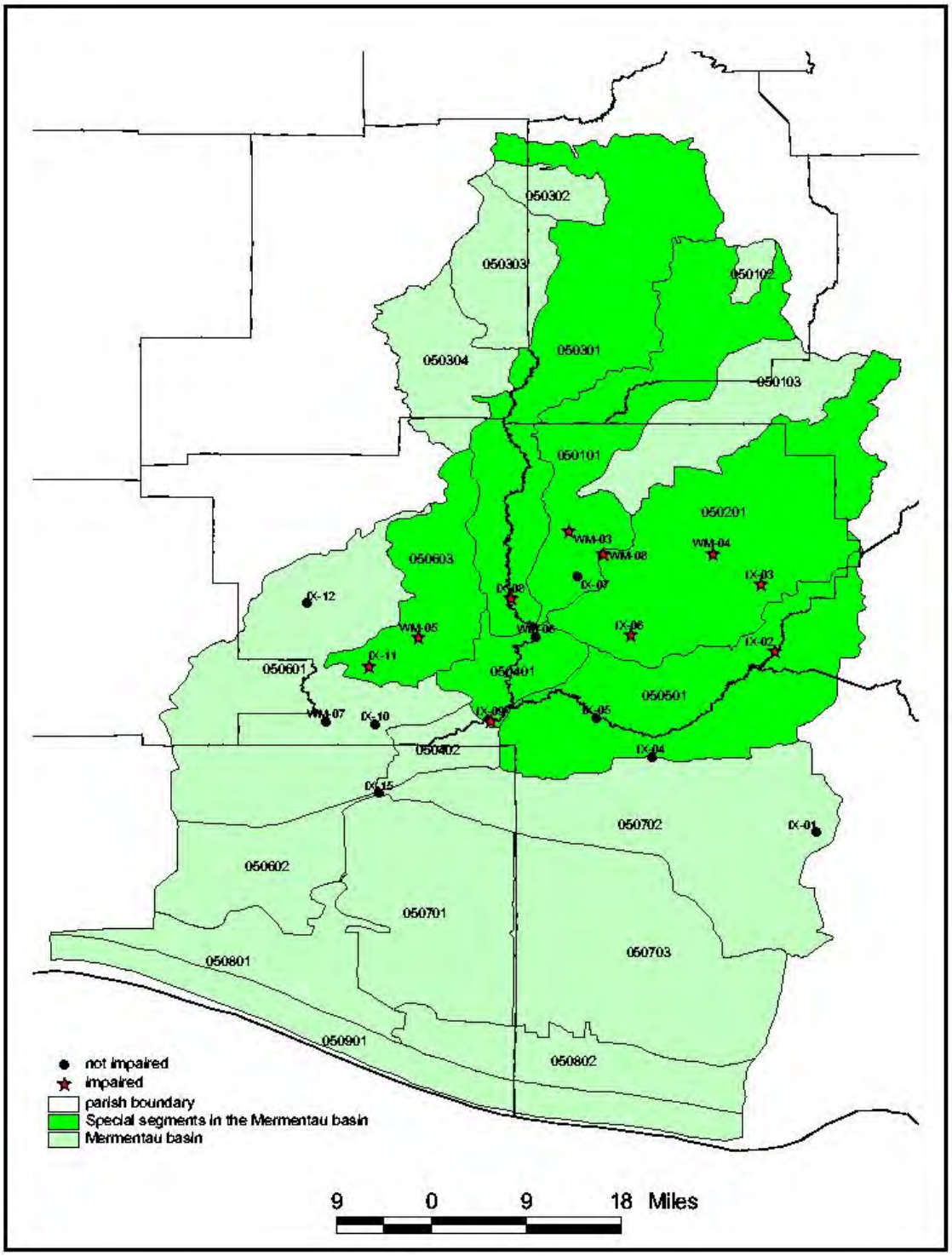

Figure 1. Map of the Mermentau Watershed showing coverage of sampling locations and impaired subsegmenets (bright green).

Table 1. Land Use (km^2) in the Mermentau River Watershed

Coverage Type	Area km^2	Percent of Watershed
Cropland and Pasture	5,234.48	52.3%
Water	1,192.27	11.9%
Non-forested Wetland	2,145.18	21.4%
Forested Wetland	430.39	4.3%
Evergreen Forest	421.61	4.2%
Deciduous Forest	266.56	2.7%
Urban	126.28	1.3%
Mixed Forest	145.18	1.5%
Other	40.81	0.4%
TOTAL	10,002.76	100%

specific pesticide was identified as the problem, just pesticides in general. Therefore, informal, qualitative observations rather than quantitative data were the basis for this listing. Because the listing is for pesticides in general, the first step was to identify which pesticides, if any, may be contributing to water quality standards impairments.

2.3 Water Quality Standards

Designated uses include primary contact recreation (A), secondary contact recreation (B), propagation of fish and wildlife (C) and agriculture (F) for all the subsegments listed in Table 2.

LDEQ's Antidegredation Policy (LAC 33:IX.1109.A) was reviewed and this TMDL is consistent with that policy.

Table 2. Fipronil impaired subsegments for the Mermentau Baisn

LDEQ Subsegment	Description	Designated Uses
050101	Bayou Des Cannes - Headwaters to Mermentau River	A B C F
050201	Bayou Plaquemine Brule – Headwaters to Bayou Des Cannes	A B C F
050401	Mermentau River – Origin to Lake Arthur	A B C F
050501	Bayou Queue de Tortue – Headwaters to Mermentau River	A B C F
050603	Bayou Chene – includes Bayou Grand Marais	A B C F

Narrative criterion for toxic substances may be found in the Louisiana Water Quality Standards at §1113.B.5. This reads:

> "No substances shall be present in the waters of the state or the sediments underlying said waters in quantities that alone or in combination will be toxic to human, plant, or animal life or significantly increase health risks due to exposure to the substances or consumption of

contaminated fish or other aquatic life. The numerical criteria (LAC 33:IX.1113.C.6) specify allowable concentrations in water for several individual toxic substances to provide protection from the toxic effects of these substances. Requirements for the protection from the toxic effects of other toxic substances not included in the numerical criteria and required under the general criteria are described in LAC 33:IX.1121. "

Criteria for toxic substances may be found in the Louisiana Water Quality Standards at §1113.C.6. This reads:

6b. The criteria for protection of aquatic life are based on acute and chronic concentrations in fresh and marine waters as specified in the EPA criteria documents and are developed primarily for attainment of the fish and wildlife propagation use. Where a specific numerical criterion is not derived in EPA criteria documents, a criterion is developed by applying an appropriate application factor for acute and chronic effects to the lowest LC50 value for a representative Louisiana species.

6c. Criteria for human health are derived using EPA guidelines, procedures, and equations for water bodies used as drinking water supplies and those not used as drinking water supplies. Criteria applied to water bodies designated as drinking water supplies are developed to protect that water supply for human consumption, including protection against taste and odor effects, to protect it for primary and secondary contact recreation, and to prevent contamination of fish and aquatic life consumed by humans. Criteria for water bodies not designated as drinking water supplies are developed to protect them for primary and secondary contact recreation and to prevent contamination of fish and aquatic life consumed by humans. In some cases, the maximum contaminant levels (MCLs) from the National Drinking Water Regulations, when more restrictive, are used as the criteria. For those toxic substances that are suspected or proven carcinogens, an incremental cancer risk level of 10^{-6} (1 in 1,000,000) is used in deriving criteria, with the exception of 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) and hexachlorocyclohexane (lindane, gamma BHC), in which case 10^{-5} (1 in 100,000) is used to derive the criteria.

2.4 Evaluating Pesticides Data

To develop a TMDL it is necessary to establish quantitative measures that can be used to establish the relationship between a pollutant (pesticide) and its impact on water quality. Once a pesticide has been identified, a numeric target value for that pesticide which distinguishes between the impaired and unimpaired state of the water body must be established (USEQP, 1999). LDEQ has adopted numeric criteria for a number of pesticides, including Aldrin, Chlorodane, DDT, TDE(DDD), DDE, Dieldrin, Endosulfan, Endrin, Heptachlor, Lindane and Toxaphene. It was recognized that this list of pesticides is very limited and does not fully represent currently used pesticides. In order to access pesticides currently in use, they must first be identified.

A review of the LDAF data (1992-1999) identified 26 pesticides (Appendix A-1) with values reported at levels above method detection levels (MDL). In the absence of numeric criteria for these 26 pesticides, EPA developed a numeric target for each of these pesticides. EPA developed numeric target values do not represent a water quality criterion or standard; rather, it is a numeric target used by EPA to assess if a water body would be reasonably expected to be impaired based on the state's no toxics in toxic amounts narrative criterion. These numeric target values were established in accordance with procedures outlined in the State of Louisiana Water Quality Standards for toxics and supporting documentation submitted to EPA Region 6

(Appendix B-1). A more comprehensive description can be found in Appendix B-2 "Rationale for Development of Screening Levels in Louisiana 303(d) Streams Listed for Pesticides".

In response to reports of low crawfish production in 1999 possibly due to the use of Icon®, the trade name for fipronil, LDAF conducted a study of fipronil toxicity in the Mermentau River Basin. Seventeen stations throughout the rice belt were sampled weekly from March through August in 2000. The water column samples were analyzed for concentrations of fipronil. In 2001, a follow up study was undertaken on nine of the same stations. Weekly water column samples were collected beginning in March and continuing until no detects are observed at any of the stations or August, which ever comes first. These data (Appendix C) were reviewed for exceedances of the freshwater acute and chronic numeric targets of 4.6 and 2.3 ug/l, respectively.

LDAF also routinely monitors for pesticides on a quarterly basis at fixed stations throughout the Mermentau River Basin. Data from 1999 through 2000 were reviewed for fipronil exceedances of the freshwater acute and chronic numeric targets. Fipronil was detected and reported in the second quarter (0.31 ug/l) during 1999 and the third quarter (0.24 ug/l) in 2000. Neither of these values exceeds the numeric targets as described above.

Exceedances of either the acute or chronic numeric target were noted for each impaired water body. If a pesticide concentration did not exceed its numeric target more than once in a three-year period, the water body was considered to be fully supporting. If a pesticide concentration exceeded its numeric target two or more times during a three year period, the percentage of samples in which this occurred was used to further assess the water body as either partially supporting or not supporting with regard to the pesticide of concern. Water bodies classified as partially or not supporting require a TMDL.

Fipronil was found in concentrations reasonably expected to be harmful to freshwater aquatic life at ten sites within five subsegments (Appendix E). Four of the subsegments are within the Mermentau River drainage including Bayou Des Cannes, Bayou Plaquemine Brule, Bayou Queue de Tortue and the Mermentau River. Of these four, only the Bayou Des Cannes subsegment is included in the 1999 Court ordered 303(d) list. The fifth subsegment, Bayou Chene is part of the Bayou Lacassine watershed, a separate drainage in the lower portion of the Mermentau Basin but to the west of the Mermentau River.

2.5 Fipronil

Fipronil is a highly effective broad spectrum phenylpyrazole insecticide for the control of a wide range of crop, public hygiene, amenity and veterinary pests. Fipronil under the trade name of Icon® 6.2 FS is a commercially-applied seed treatment for rice which controls rice water weevil, seed midge, rice borers and grape colaspis up to the panicle differentiation stage of the rice. It may be applied to dry rice seed which will be drilled or broadcast, or to pre-germinated rice after the rice has been soaked and drained (Aventis 2000). Use restrictions recommended by Aventis Crop Science (Aventis) include:

- To prevent treated rice seed from drifting into crawfish ponds in production during aerial seeding, maintain a 100 foot buffer zone between crawfish ponds and the treated portion of the rice fields.
- After seeding, hold water in treated rice field for 24 hours before release into drainage ditches.
- Do not release water from treated rice fields directly into crawfish ponds.
- Do not fish or commercially grow fish, shellfish, or crawfish in treated rice fields prior to harvest.
- Do not plant leafy vegetables within one month following planting of treated rice seed.
- Do not plant root crops within five months following planting of treated rice seed.
- Do not plant small grains, other than rice, within twelve months following planting of treated rice seed.

Toxicity of fipronil to fish varies with species. It is very highly toxic to bluegill sunfish (96 hour LC50= 83ug/l). Fipronil is also toxic to a wide range of aquatic invertebrates, very highly toxic to shrimps and other crustacea and very highly toxic to oysters (EPA 1996). The metabolite MB 46136 is more toxic than the parent compound to freshwater fish (3.3 times more toxic to bluegill sunfish). Metabolite 46136 is 6.6 times more toxic than the parent compound and MB 45950 is 1.9 times more toxic than the parent compound to freshwater invertebrates. Fipronil's tendency to bind to sediments and its low water solubility may reduce the potential hazard to aquatic wildlife (Harmon, et al 1996; USEPA 1996).

2.5.1 Environmental Fate

Fipronil is stable to hydrolysis under mildly acid to neutral pH conditions, but degrades under alkaline conditions (pH). Field persistence is low to moderate in water and soil. Fipronil residues tend to stay in the upper 15 cm of the soil and exhibit low potential to leach to groundwater (EPA 1996, Tingle, et al 2000). In aquatic environments, fipronil residues rapidly move from the water to the sediment with over 95% of the residues being found in or on the sediments within one week of application (Bobe *et al* 1998; Stevens, et al 1998). Photodegradation produces a variety of metabolites, one of which is extremely stable (MB 46513) and is more toxic than the parent compound (EPA, 1998).

2.6 Fipronil Sources

2.6.1 Nonpoint Sources

The only source of fipronil in the Mermentau River Basin is its use in rice farming in the 13 Southern Louisiana rice-growing parishes. Constant monitoring of the seed from treaters to sales persons to growers is required under the regulations put into effect on March 3, 2000 by LDAF (LSU News Release 2000a). Of the approximately 600,000 acres statewide planted in rice annually, 280,000 acres or 46% are attributed to the Mermentau River Basin (personal communication with Butch Stegall). Land use analysis shows that 54% of the land area is cropland or pasture in the Mermentau River Basin.

Exceedances in the fipronil chronic numeric target (2.3 ug/L) for freshwater aquatic life protection occurred in March and April. In Louisiana, the growing season ranges from late February through September. Surface water from bayous and streams or ground water from wells is used to flood the fields prior to planting (late February until early June). Shortly after flooding, the seed is water planted. Once the rice seed has germinated, the water is drained and the field is flooded again. The field water is then held until two weeks prior to harvest (mid July through September depending upon when the rice was planted) at which time it is released. It is believed that this practice contributes the greatest loads of fipronil to the system.

2.6.2 Point Sources

There are no known point sources for fipronil in the Mermentau River Basin. Effluent from several hundred other point source dischargers in the Mermentau River Basin is not expected to contain fipronil because its use is limited to rice farming. Therefore, concentrations of Fipronil in their effluents are not expected and would be considered an enforcement issue and dealt with accordingly.

3.0 TMDL Load Calculations

3.1 Current Load Evaluation

Fipronil loads have been calculated using the chronic numeric target (2.3 ug/l) and stream flow. The following equation can be used to calculate fipronil loads.

Equation 1: C x 0.001 x Q in cfs x 5.39 or C x 0.001 x Q in MGD x 8.34

Where: C = concentration in mg/L
Q = stream flow in cfs or MGD

A traditional expression of the fipronil loading may be developed by setting one critical or representative flow and concentration, and calculating the fipronil loading using Equation 1. For the purpose of calculating current critical loading for these basins, the chronic fipronil numeric target for freshwater was used as the concentration in conjunction with the critical flow (7Q10) at the lower portion of the major drainages in each basin (Table 3). Using these values and Equation 1, the estimated current loading for the February-September growing season for each drainage is given in Table 3.

3.2 TMDL

Flow is a critical element in establishing a TMDL. Point sources usually have a defined critical receiving stream low flow such as the 7Q10 at which the criterion must be met. For nonpoint sources it is recognized that there may be no single critical flow condition. To address this condition, a TMDL fipronil loading curve for (Figure 2) for the growing season (February thru September) has been generated. This TMDL loading curve was developed using Equation 1 and substituting the fipronil concentration with the chronic numeric target (2.3 ug/l) and varying

Table 3. Estimated freshwater fipronil loading for major drainages in the Mermentau River Basin

Drainage/Location	7Q10 (cfs)	Concentration (ug/l)	Loading (lbs/day)
Mermentau River above Lake Arthur	68.52[1]	2.3	0.85
Bayou Lacassine above Grand Lake	1.22[2]	2.3	0.015

1. 7Q10 value obtained from projection runs contained in the Mermentau River Watershed TMDL for Dissolved Oxygen Including WLAS for Two Treatment Facilities (Baker, 1999)
2. 7Q10 value obtained from projection runs contained in Bayou Lacassine Watershed TMDL for Dissolved Oxygen Including WLAS for Two Treatment Facilities (FTN, 1999).

the flows. The attempt here is to show that while a TMDL may be expressed as a single point, it can also be thought of as a continuum of points representing the numeric target and various flow values. This curve may be applied to any freshwater stream. This curve represents the TMDL loading allocation for fipronil in the Mermentau River Basin. For example, a 7Q10 flow at the Mermentau River above Lake Arthur has been used for expressing the TMDL as a load. This point is shown on the loading curve (Figure 2).

Utilizing Figure 2, one can select a freshwater stream flow value (x-axis) and can quickly determine the TMDL fipronil loading value. For example, a 7Q10 flow (68 cfs) at the Mermentau River above Lake Arthur has been used for expressing the TMDL as a load. This point is shown on the loading curve (Figure 2). The line formed by this series of points may be thought of as a boundary. At any given flow, the loading calculated from ambient in-stream concentrations may be below the line, within the boundary, or above the line. Such loading values represent the observed or current condition. Therefore, observed fipronil load values falling above the line represent high values relative to the numeric target and need to be reduced. Likewise, observed fipronil loading values falling below the line represent low loads relative to the numeric target value and no action is needed.

Load reductions are only necessary when the calculated observed loading value falls above the line in Figures 2 and 3. For example, say the observed concentration in the Mermentau River above Lake Arthur is 3.0 ug/l and the observed flow is 68 cfs. Using equation 1, the observed load would be 1.1 lbs/day. This value falls above the line in Figure 2, therefore a load reduction is needed. Equation 2 below can be used to calculate the needed reduction. Therefore, subtracting the TMDL load (0.84 lbs/day) from the observed load (1.1 lbs/day) equals 0.26 lbs/day representing the needed reduction.

Equation 2. Current (observed) Load – TMDL load = Load Reduction

The load reduction value can be converted into a percent reduction using Equation 3 below. In our example, the percent reduction required is the load reduction (0.26 lbs/day) divided by the observed load (1.1 lbs/day) times 100; therefore, the percent reduction is 23.6%.

Equation 3. Load Reduction / Current Load x 100 = % reduction

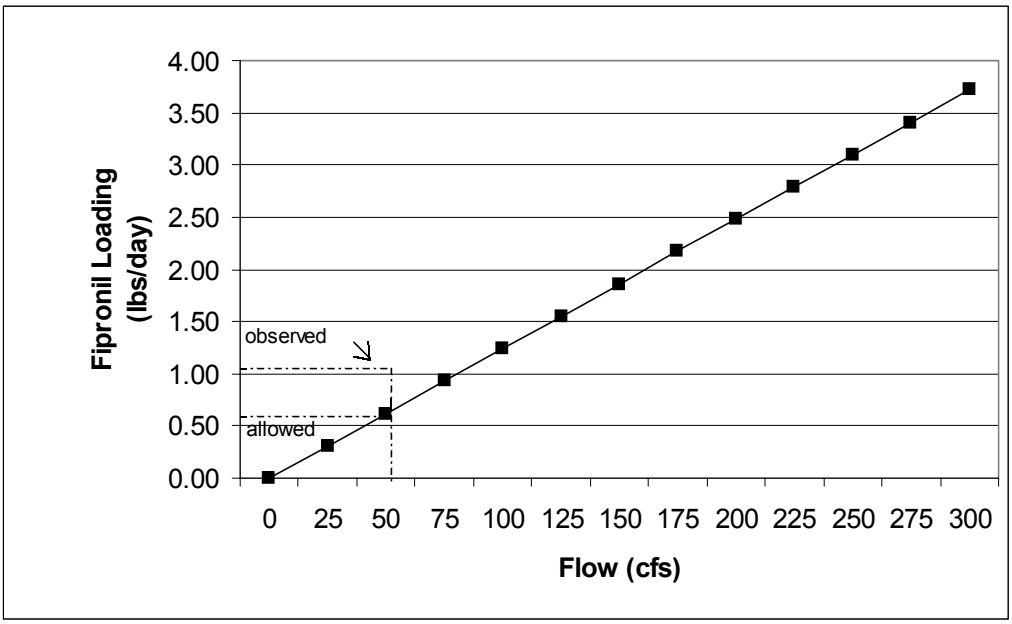

Figure 2. TMDL fipronil loadings curve.

3.2 Wasteload Allocation (WLA)

Since there are no point source discharges, the WLA will be set to zero.

3.3 Load Allocation (LA)

As mentioned previously, this TMDL is written to cover five subsegments in the Mermentau River Basin. Therefore, the load allocation for a given flow can be calculated using Equation 1 and the following relationship:

(TMDL @ given flow and numeric target) – (WLA) = LA

In addition to the LA, no introduction of fipronil which causes localized concentrations to be greater than the appropriate numeric target (freshwater: 2.3 ug/l) will be authorized.

3.5 Seasonal Variation

Section 303(d)(1) requires that all TMDLs be "established at a level necessary to implement the applicable water quality standard with seasonal variations. A review of the data shows that, in general, values greater than the numeric target value for freshwater and estuarine waters are more likely to occur in the months of March and April, which fall within the growing season. Therefore, the growing season from late February through September is identified as the critical period. Also, because it has been determined the most likely impact is from draining of rice fields and not necessarily storm water events, it is more likely that impacts will be observed

during low flow conditions. For this reason, low flow conditions, defined as a 7Q10, have been used in the calculation of the TMDL loads.

3.3 Margin of Safety

The CWA requires that each TMDL be established with a MOS. This requirement for a MOS is intended to account for uncertainty in available data or in the actual effect controls will have on the loading reductions and receiving water quality. A MOS may be expressed explicitly as unallocated assimilative capacity or implicitly through conservative analytical assumptions used in establishing the TMDL. The MOS is not intended to compensate for failure to consider known sources. Because of the nature of the pollutant and the fact that use restrictions have been implemented, it was determined that an implicit MOS was appropriate for this TMDL.

4.0 Reasonable Assurance and Other Relevant Information

The goal of this TMDL is to reduce fipronil concentrations in the five subsegments listed in the Mermentau River Basin to meet the water quality objectives for toxicity and pesticide. As previously discussed the only use of fipronil in these subsegments and the Mermentau River Basin is for applications for rice farming. Use restrictions, as listed in Section 2.5, were established by Aventis and LDAF to reduce the exposure of crawfish to fipronil. Additional restrictions were established to reduce other sources of fipronil. Attainment of these targets and allocations are expected to result in attainment of the narrative objectives for toxicity and pesticides, and, hence, protect the freshwater and wildlife habitat beneficial uses in these subsegments.

5.0 Regulatory Authority

LDAF is the lead agency for pesticide regulatory control in Louisiana. The jurisdiction and authority of LDAF relative to pesticide matters is set out in the Louisiana Pesticide Law (Title 3 of the Louisiana Revised Statutes). Under the state regulatory system, the commissioner has the authority to adopt rules and regulations necessary to implement the provisions under this law including but not limited to rules and regulations governing the registration, distribution, sale, offering for sale, and application of pesticides. Furthermore, the commissioner has the authority to establish emergency procedures involving imminent danger to human health or the environment.

Under the Louisiana Pesticide Law, each pesticide, which is sold, offered for sale, or distributed in Louisiana, is registered annually. Proper certification is required to apply or supervise the application of any restricted use pesticide as a private applicator. Proper licensing is required for individuals who own or operate a business engaged in the applications of pesticides for a fee. A key component of enforcement is that it is illegal to make a pesticide recommendation or application inconsistent with the labeling or in violation of the EPA or state restriction on the use of that pesticide.

It is the responsibility of the commissioner to determine when the concentrations of pesticide wastes exceed promulgated federal or state standards, or when the concentrations of

pesticides pose a threat or reasonable expectation of a threat to human health or to the environment. When such determinations are made, the commissioner shall decide the appropriate action to be taken.

LDAF monitors quarterly for the presence of pesticides in the waters of Louisiana. Determinations of excessive levels are based on scientific and technical information. Investigations may be conducted to facilitate such determinations. Excessive pesticide concentrations are alleviated through minimizing, mitigating, and preventing the potential for excessive levels. If necessary, appropriate enforcement actions may be taken.

6.0 Public Participation

When EPA establishes a TMDL, the Agency provides the public an opportunity for comment concerning the TMDL. EPA will commence preparation of a notice seeking comments, information and data from the general and affected public. If comments, data or information are submitted during the public comment period, then the TMDL may be revised accordingly. After considering public comment, information and data, and making any appropriate revisions, EPA will transmit the revised TMDL to the Court, and to the LDEQ for incorporation into LDEQ's current water quality management plan.

REFERENCES

Aventis Information Sheet. 2000. Rice Seed Treated with ICON® 6.2 FS Insecticide. Aventis Crop Science USA LP, Research Triangle Park, NC.

Bobe, A., J.F. Cooper, C.M. Coste, and M.A. Muller. 1998. Behaviour of fipronil in soil under Sahelian Plain field conditions, Pestic. Sci., 52(3), 275-281.

EPA, 1998. Fipronil for use on Rice (Regent®, Icon®) and Pets (Frontline®). HED Risk Assessment. Chemical 129121. USEPA Washington DC 20460, USA. Office of Prevention, Pesticides and Toxic Substances. 90pp + 3 attachments.

EPA, 1996. Fipronil Pesticide Fact Sheet. EPA-737-F-96-005. Office of Prevention, Pesticides and Toxic Substances, Washington DC, 10460,. http://www.epa.gov/fedrgstr/EPA-PEST/199…ay-12/pr-736DIR/Facts/Factsheet.txt.htm.

Hamon, Nicholas, Richard Shaw and Henry Yang. 1996. Worldwide development of fipronil insecticide. Proc.-Beltwide Cotton Conf 2:759-765.

LDEQ, 1999. *Environmental Regulatory Code, Part IX. Water Quality Regulations.* Louisiana Department of Environmental Quality.

Louisiana State University, 2000a. News Release: New Regulations Provide For Safe Planting With Icon Rice Pesticide. March 9, 2000. LSU Agricultural Center News. http://www.agctr.lsu.edu/inws0309.htm

_____ 2000b. News Release: LSU AgCenter Scientist Find Possible Link Between Pesticide, Crawfish Mortality. May 15, 2000. http://www.agctr.lsu.edu/wwwac/icon/mcclain.htm.

Stevens, M. M., K. M Fox, G.N. Warren, B. R. Cullis, N. E. Coombes & L.G. Lewis. 1998. An image analysis technique for assessing resistance in rice cultivars to root-feeding chironomid midge larvae (Dipters: Chrionomidae). Field Crops Research 57 (1998)) 195-207.

Tingle, C.C.D., J. A. Rother, C. F. Dewhurst, S. Lauer & W. J. King. 2000. Health and environmental effects of fipronil. Pesticide Action Network UK Briefing Paper. London, UK. 30pp.

USGS. 1997. *Water Resources Data - Louisiana, Water Year 1996.* U. S. Geological Survey, Water Resources Division. Baton Rouge, Louisiana. USGS-WDR-LA-96-1.

USGS & EPA, 1995. National Land Cover Data (NLCD) for Louisiana

APPENDIX A: Recommended Freshwater Aquatic Life Protection Numeric Targets for Pesticides in Louisiana TMDL Development

CAS #	Name	Conc. (ug/l) LC50	Acute Numeric Level (ug/l)	Chronic Numeric Level (ug/l)	Species
94757	2,4-D	6,539	654	327	*Micropterus dolomieui*
15972608	Alachlor		760	76	EPA Recommended Criteria
101053	Anilazine	3	0.3	0.15	*Ceriodaphnia dubia*
1912249	Atrazine		328.6	11.56	Draft EPA Recommended Criteria
28249776	Benthiocarb	510	51	25.5	*Ceriodaphnia dubia*
314409	Bromacil	186,000	18,600	9,300	*Pimephales promelas*
1563662	Carbofuran	2.6	0.26	0.13	*Ceriodaphnia dubia*
81777891	Clomazone	34,000	3,400	1,700	*Lepomis macrochirus*
21725462	Cyanazine	12,693	1,269	635	*Ictalurus punctatus*
333415	Diazinon		0.1	0.1	Draft EPA Recommended Criteria
99309	Dichloran	1.08	0.11	0.055	*Lepomis macrochirus*
55290647	Dimethipin	20,900	2,090	1,045	Daphnia sp.
120068373	Fipronil	45.6	4.6	2.3	*Lepomis macrochirus*
2164172	Fluometuron	3,157	316	158	*Ameiurus melas*
51218452	Metolachlor		390	100	EPA Recommended Criteria
298000	Methyl Parathion	3.4	0.34	0.17	Southern House Mosquito
21087649	Metribuzin		N/A	100	EPA Recommended Criteria
2212671	Molinate	327	32.7	16.35	*Lepomis macrochirus*
27314132	Norflurazon	16,300	1,630	815	*Lepomis macrochirus*
19666309	Oxidiazon	2,400	240	120	*Daphnia magna*
40487421	Pendimethalin	280	28	14	*Ceriodaphnia dubia*
7287196	Prometryne	10,000	1,000	500	*Lepomis macrochirus*
709988	Propanil	1,540	154	77	*Ceriodaphnia dubia*
60207901	Propiconazole	2,925	292	146	*Lepomis macrochirus*
5902512	Terbacil	33,948	3,395	1,697	*Lepomis macrochirus*
59669260	Thiodicarb	27	2.7	1.35	*Daphnia magna*
55335063	Tricorpyr	4,243	424.3	212	Mayfly
1582098	Trifluralin	32.3	3.23	1.62	*Lepomis macrochirus*

LC_{50} values used – 48 hour for invertebrates and 96 hour for vertebrates

APPENDIX B-1: State of Louisiana Water Quality Standards for toxics and supporting documentation submitted to EPA Region 6

LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF WATER RESOURCES
WATER POLLUTION CONTROL DIVISION
JUNE, 1989

DOCUMENTATION OF NUMERICAL CRITERIA FOR ACUTE AND CHRONIC AQUATIC LIFE PROTECTION IN THE 1989 WATER QUALITY STANDARDS REVISION

Numerical criteria for fresh water and marine water aquatic life protection as listed in Table 1 of the proposed 1989 Water Quality Standards revision were derived from criteria documents of the Environmental Protection Agency. Aquatic life criteria for the following toxic substances were taken directly from those recommended in the EPA document Quality Criteria for Water 1986:

1. Aldrin
2. Chlordane
3. DDT
6. Dieldrin
7. Endosulfan
8. Endrin
9. Heptachlor
10. Hexachlorocyclohexane (gamma BHC, Lindane)
11. Polychlorinated Biphenyls, Total (PCB's)
12. Toxaphene
13. 2, 4-Dichlorophenoxyacetic acid (2, 4-D)
14. 2-(2, 4, 5-Trichlorophenoxy) propionic acid (2, 4, 5-TP, Silvex)
46. Arsenic
47. Chromium III (Tri) - Freshwater Acute and Chronic only
48. Chromium VI (Hex)
49. Zinc

Numerical criteria for aquatic life protection for the remaining toxic substances were not directly available from EPA and were derived from LC50 data for each toxic substance as presented in the following EPA documents; (1) Ambient Water Quality Criteria, 1980. EPA Series 440/5-80 and (2) Ambient Water Quality Criteria. 1984. EPA Series 440/5-84-85. To derive a criterion value, an application factor was multiplied by the lowest reported LC50 value for a representative Louisiana species as listed in Table 1 of the EPA criteria documents. Appliction factors used were those recommanded in the EPA Water Quality Criteria 1972 (p. 123) and Quality Criteria for Water 1976 (p. 2, 3). This approach was developed in cooperation with Region VI EPA. For nonpersistent or noncumulative toxic substances, an application factor of 0.1 was used for acute protection and 0.05 was used for chronic protection. For persistent or cumulative toxic substances, an application factor of 0.05 was used for acute protection and 0.01 was used for chronic protection. The use of application factors provides a safety consideration to protect all life stages of a test species as well as to protect associated species that have not been tested and may be more sensitive to the tested toxic substance.

The following is a listing of the lowest reported LC50 values and representative Louisiana species utilized to derive numerical criteria.

Toxic Substance	Class [1]	Species [2]	LC50 [3]
4. TDE (DDD)	P	Scud	0.6
		Oyster	25
5. DDE	P	Planarian	1,050
		Oyster	14
15. Benzene	NP	Bluegill [4]	22,490
		P. pugio	27,000
16. Carbon Tetrachloride	NP	Bluegill	27,300
		T. Silverside	150,000
17. Chloroform	NP	Daphnia m.	28,900
		Pink Shrimp	81,500
18. Ethylbenzene	NP	Bluegill [5]	32,000
		M. bahia	87,600
19. 1, 2-Dichloroethane (EDC)	NP	Fathead minnow	118,000
		M. bahia	113,000
20. 1, 1, 1-Trichloroethane	NP	Fathead minnow	52,800
		M. bahia	31,200
21. 1, 1, 2-Trichloroethane	NP	Daphnia m.	18,000
	No data for Marine Water Species		
22. 1, 1, 2, 2-Tetrachloroethane	NP	Daphnia m.	9,230
		M. bahia	9,020
23. 1, 1-Dichloroethylene	NP	Daphnia m.	11,600
		M. bahia	224,000
24. Trichloroethylene	NP	Daphnia p.	39,000
		P. pugio	2,000
25. Tetrachloroethylene	NP	Daphnia m.	8,500
		P. pugio	1,300
26. Toluene	NP	Bluegill	12,700
		P. pugio	9,500
27. Vinyl Chloride	No Aquatic Toxicity Data Reported		
28. Bromoform	NP	Bluegill	29,300
		Sheepshead minnow	17,900
29. Bromodichloromethane	No Aquatic Toxicity Data Reproted		

Toxic Substance	Class [1]	Species [2]	LC50 [3]
30. Methylene Chloride	NP	Fathead minnow	193,000
		M. bahia	256,000
31. Methyl Chloride	NP	Bluegill	550,000
		T. Silverside	270,000
32. Dibromochloromethane	No Aquatic Toxicity Data Reported		
33. 1, 3-Dichloropropene	NP	Bluegill	6,060
		M. bahia	790
34. 2-Chlorophenol	NP	Daphnia m.	2,580
	No Data for Marine Water Species		
35. 3-Chlorophenol	No Aquatic Toxicity Data Reported		
36. 4-Chlorophenol	NP	Bluegill	3,830
		Sheepshead minnow	5,350
37. 2, 3-Dichlorophenol	No Aquatic Toxicity Data Reported		
38. 2, 4-Dichlorophenol	NP	Bluegill	2,020
	No Data for Marine Species		
39. 2, 5-Dichlorophenol	No Aquatic Toxicity Data Reported		
40. 2, 6-Dichlorophenol	No Aquatic Toxicity Data Reported		
41. 3, 4-Dichlorophenol	No Aquatic Toxicity Data Reported		
42. Phenol (total)	NP	Daphnia m.	7,000
		P. pugio	5,800
43. Benzidine	NP	Red Shiner	2,500
	No Data for Marine Water Species		
44. Hexachlorobenzene	No Aquatic Toxicity Data Reported		
45. Hexachlorobutadiene	P	Fathead Minnow	102
		P. pugio	32
47. Chromium III	P	Oyster	10,300

1. P - persistent; application factors - 0.05 (acute), 0.01 (chronic)
   NP - nonpersistent; application factors - 0.10 (acute), 0.05 (chronic)

2. First listed species for Freshwater
   Second listed species for Marine Water

3. LC 50's reported in ug/L, parts per billion

4. Grass shrimp, Palaemonetes pugio

5. Mysid shrimp, Mysidopsis bahia

PROCEDURES FOR HUMAN HEALTH CRITERIA CALCULATION IN LOUISIANA

by Patrick Moore
Louisiana Department of Environmental Quality
Office of Water Resources
Baton Rouge, Louisiana
May 11, 1994

Introduction

The development of numerical criteria for human health protection follows guidance established by the U.S. Environmental Protection Agency (EPA). This guidance is established in a series of EPA documents including publications in the Federal Register. The approach used in developing the human health criteria for the Louisiana Surface Water Quality Standards was originally described in a Documentation Report for the 1989 Louisiana Water Quality Standards, prepared by the Louisiana Department of Environmental Quality, Office of Water Resources (LDEQ-OWR) in June, 1989.

The basic approach used by LDEQ-OWR to develop numerical water quality criteria for human health involves the review of toxicological data for each substance of concern in state waters. Substances of concern are derived from assessment of monitoring programs for water, fish and sediments, discharge and toxic release data, and other relevant information on state waters including the biennial state Water Quality Inventory (305(b) report). EPA's Integrated Risk Information System (IRIS) is used to establish the latest toxicological information on each substance. If the substance is designated as a carcinogen then the appropriate cancer potency slope factor (SF) is obtained; if it is designated a non-carcinogen, then the reference dose (RfD) is obtained. Bioconcentration factors (BCF) are also reviewed through appropriate data bases and updated if necessary. This information is then combined with other appropriate factors in the risk assessment formula to derive the criteria. Other factors considered in the formula include body weight, risk level, fish consumption, drinking water intake, and incidental ingestion while swimming. Categories of criteria are then developed for each toxic substance for drinking water (Public Water Supplies), non-drinking water, and non-swimming water (Secondary Contact).

For those toxic substances in which no toxicological data are available in the IRIS data base, the primary or secondary standards from the drinking water regulations, if available, may be used to provide a level of human health protection. As a special level of protection for drinking water supplies, taste and odor criteria may be used for

those substances associated with taste and odor problems.

The basic formulas, illustrated below, were obtained from a Federal Register notice, November 28, 1980. Further explanation and description of these guidelines can be found in *Assessing Human Health Risks from Chemically Contaminated Fish and Shellfish: A Guidance Manual*. The 1980 Federal Register notice established the use of 2 liters for the average water consumption and the use of 70 kilograms for an average adult body weight. Carcinogenic SFs and non-carcinogenic RfDs are obtained from EPA's IRIS. The fish consumption rate of 20 grams per day used in the formulas was obtained from the U.S.Department of Agriculture's 1984 National Consumption Statistics. A health risk level of one in a million (10^{-6}) has been established for determining criteria for carcinogens with the exception of dioxin and lindane, which have been assigned a 10^{-5} risk level. Additionally, a SF is figured into the formula if the chemical has been given a cancer classification of A, B1, B2, or C. If the chemical has not yet been shown to be a carcinogen, or, if it has been shown that it is not a carcinogen, then a RfD is used instead of a SF.

For water bodies with the designated use of primary contact recreation (swimming), an incidental ingestion rate is included in the formula. The incidental rate is given by this formula:

$$\frac{250ml}{hour}\ possible\ ingestion \times \frac{5hrs}{wk}\ swimming\ duration \times \frac{6mos}{12mos}\ swimming\ season \times \frac{1week}{7days} = 89 \times \frac{ml}{day} = 0.089\ \frac{liters}{day}\ incidental\ ingestion$$

The following are descriptions of items used in the risk-based formulas:

10^{-6}	= risk level
70 kg	= average adult male body weight
BCF	= bioconcentration factor in L/kg
0.02 kg/day	= national average amount of fish/shellfish consumed daily in kilograms (20 g/day)
SF	= cancer potency slope factor in $mg/kg/day^{-1}$
RfD	= reference dose in mg/kg/day
2 L/day	= national average amount of water consumed daily in liters

The equation for a carcinogen in waters designated as public water supply is:

$$Criteria\ \frac{mg}{L} = \frac{(10^{-6})\ (70kg)}{SF[0.089L/day + 2L/day + (BCF)\ (0.02kg/day)]}$$

The following equation is for a non-carcinogenic chemical in water bodies designated as public water supplies:

$$Criteria\ \frac{mg}{L} = \frac{RfD \times 70\,kg}{0.089\,L/day + 2\,L/day + (BCF)\,(0.02\,kg/day)}$$

The equation for a carcinogen in waters not designated as public water supplies is:

$$Criteria\ \frac{mg}{L} = \frac{(10^{-6})\,(70\,kg)}{SF[0.089\,L/day + (BCF)\,(0.02\,kg/day)]}$$

The equation for a non-carcinogen in waters not designated as public water supplies is:

$$Criteria\ \frac{mg}{L} = \frac{RfD \times 70\,kg}{0.089\,L/day + (BCF)\,(0.02\,kg/day)}$$

The equation for a carcinogen in non-drinking waters with secondary contact recreation (no swimming use) is:

$$Criteria\ \frac{mg}{L} = \frac{(10^{-6})\,(70\,kg)}{SF[(BCF)\,(0.02\,kg/day)]}$$

The equation for a non-carcinogen in non-drinking waters with secondary contact recreation (no swimming use) is:

$$Criteria\ \frac{mg}{L} = \frac{RfD(70\,kg)}{BCF(0.02\,kg/day)}$$

For excepted use water bodies, special procedures for calculating site-specific criteria may be used. In general, for water bodies with the primary contact recreation use removed, the incidental ingestion rate for water will also be removed from the equation. Most states do not have an incidental ingestion rate for swimmers, and, even so, most of Louisiana's human health criteria will be more stringent than other states. A use attainability analysis may show that a special water body supports only a limited fishery use. The fish population in this type of water body is not composed of typical sport fish for consumption. Instead, the fish are usually small and

inappropriate for human consumption. Therefore, for excepted use water bodies, Louisiana will use the national fish consumption rate of 6.5 grams per day, or another suitable fish consumption rate, rather than the usual 20 grams per day. Since many states use this or other fish consumption rates, Louisiana criteria for this type of water body will still be comparable to the human health criteria of other states.

Modifying the Criteria

Because toxicological information is subject to change, the scientific data must be checked periodically and updated, if necessary. Occasional comparisons of 1) EPA's IRIS and 2) the appropriate, most current criteria documents to LDEQ's human health criteria spreadsheet will facilitate any modifications to any particular criterion. If any of the criteria needs modifying, changes can most easily be made through the already established QUATTRO PRO spreadsheet.

Accessing the Spreadsheet

(Note: These instructions are written to enter the spreadsheet with a MOUSE. If one wishes to work within QUATTRO PRO strictly using his/her keyboard, he should use the ?/ key in conjunction with the arrow and ENTER key.)

To access the spreadsheet, at the C prompt type — cd QPRO

At the C:\QPRO > prompt, type — Q

Once in the spreadsheet, click on — FILE then — RETRIEVE

Click on the file named — TOXICCAL.WK2

YOU ARE NOW IN THE LDEQ HUMAN HEALTH CRITERIA TABLE.

To Make Changes to Parameters

Move cursor to desired cell (parameter-column and chemical-row), type in correction, and press ENTER

Screen will blink twice and new number(s), and new criteria, will appear.

To Edit the Formulas (for columns J, K, and L)

Arrow over to either column J, K, and/or L. Press F2 then use both the ← → keys and DELETE to make desired changes.

To keep changes, press ENTER.
(NOTE: IF YOU HAVE MADE UNDESIRABLE CHANGES, PRESS ESC TWICE TO START EDITING PROCESS OVER.)

To Print

Click on PRINT then BLOCK.

Once in BLOCK then type A3..M58 (or the line corresponding to the last chemical) and press ENTER.

To View New Table in Print Mode

a) In PRINT menu, click on DESTINATION. Next click on SCREEN PREVIEW.

b) With desired BLOCK (Axx..Nxx) entered, click on SPREADSHEET PRINT. Entire table will now appear on the screen.

c) To see table better, click on ZOOM(+) and CLICK-DRAG Red Box to desired part of the screen to check for corrections made.

d) Click on UNZOOM(-) then QUIT to return to PRINT menu.

e) If part of table did not show, click on LAYOUT then PERCENT SCALING.

f) Type in a reasonable value and press ENTER.

g) Click on QUIT.

h) Repeat steps b-g until desired appearance of table is achieved.

Click on DESTINATION once more; then on GRAPHICS PRINTER.

Click on SPREADSHEET PRINT.

YOUR NEW TABLE IS NOW PRINTING

To Save/Exit the Spreadsheet

IF YOU WANT TO SAVE YOUR CHANGES:
To save changes to existing file name, click on FILE menu then SAVE AS then ENTER.

IF YOU WANT TO SAVE YOUR CHANGES UNDER A NEW FILE NAME:
Follow the previous step.
Type in the new name before pressing ENTER (QUATTRO PRO REQUIRES NAME TO BE XXXXXXXX.WKX).

IF YOU DO NOT WANT ANY CHANGES SAVED AND/OR YOU WANT TO EXIT THE SPREADSHEET:
Click on FILE then EXIT.

THIS STEP WILL EXIT YOU FROM THE SPREADSHEET AND QUATTRO PRO WITHOUT SAVING ANY CHANGES MADE TO THE TABLE.

(IF THERE ARE ANY SPECIFICS YOU WANT DONE TO THE TABLE, PLEASE CONSULT THE QUATTRO PRO MANUAL.)

Adopted Dioxin Criteria
October 1991

Table A. Calculations used to derive the proposed 1991 dioxin (2,3,7,8-TCDD) criteria for the Louisiana Surface Water Quality Standards.

ASSUMPTIONS				CRITERIA[1]	
BCF[2]	FCR[3]	SF[4]	Risk Level	Drinking Water	Non-Drinking Water
5,000	20	9,700	10^{-5}	0.71	0.72

[1] Criteria expressed in parts per quadrillion (ppq)
[2] BCF = Bioconcentration Factor (L/Kg)
[3] FCR = Fish Consumption Rate (g/day)
[4] SF = Cancer Slope Factor (mg/Kg/day)
[5] DEQ 1989 revision includes 0.089 L/day incidental water ingestion for both drinking water and non-drinking water; an additional 2 L/day used only on drinking water
[6] 70 Kg = Average adult body weight

$$\text{Drinking Water (ppq)} = \frac{(10^{-5})(70\ \text{kg})^{6}}{\text{SF}\,[0.089\ \text{L/day} + 2\ \text{L/day} + (5{,}000\ \text{L/kg})(\text{FCR kg/day})]}$$

$$\text{Non-Drinking Water (ppq)} = \frac{(10^{-5})(70\ \text{kg})}{\text{SF}\,[0.089\ \text{L/day} + (5{,}000\ \text{L/kg})(\text{FCR kg/day})]}$$

APPENDIX B-2: Rationale for Development of Numeric Targets in Louisiana 303(d) Streams Listed for Pesticides

The Environmental Protection Agency(EPA), Region 6, Water Quality Protection Division has developed numeric targets for pesticides, identified through analytical measurements, to evaluate the need for development of Total Maximum Daily Loads (TMDL) in waterbodies identified and listed as not in attainment of the State of Louisiana water quality standards, as required under §303(d) of the Clean Water Act (CWA). This action was necessary to both evaluate the need for TMDL development and as a goal when a TMDL is required. The development of the numeric targets has been performed without prior knowledge of the analytical values obtained by the Louisiana Department of Agriculture and Forestry (LDAF) through water quality monitoring. The list of analytes was reviewed by senior staff and management in the EPA Region 6, Multimedia Planning and Permitting Division, which provided Chemical Abstract Service (CAS) numbers and product names for each pesticide. Where the State of Louisiana has established water quality criteria, those criteria were used for screening. Where the EPA has developed (or drafted but not finalized) recommended aquatic life protection criteria for a pesticide, but the State of Louisiana had not adopted the criteria, the EPA recommended criteria was used as a numeric target. For all other measured pesticides numeric targets were established in accordance with the State of Louisiana Water Quality Standards and established procedures submitted to EPA Region 6.

In accordance with LAC 33:IX.1113.C.6.b., acute and chronic aquatic life values were developed, based on information contained in EPA's ECOTOX (ecological toxicity) database and from EPA's Office of Pesticides database, supplied by the Region 6 Multimedia Planning and Permitting Division, Pesticides Section. LAC 33:IX.1113.C.6.b. states;

> "The criteria for protection of aquatic life are based on acute and chronic concentrations in fresh and marine waters as specified in the EPA criteria documents and are developed primarily for attainment of the fish and wildlife propagation use. Where a specific numerical criteria is not derived in EPA criteria documents, a criterion is developed by applying an appropriate application factor for acute and chronic effects to the lowest LC_{50} value for a representative Louisiana species."

In implementing this provision EPA reviewed the available data and used the lowest 48-hour LC_{50} values for invertebrate species indigenous to Louisiana, and the lowest 96-hour LC_{50} values for vertebrate species indigenous to Louisiana. EPA utilized application factors of 0.1 for acute criteria and 0.05 for chronic criteria, in accordance with the document submitted to EPA Region 6 *"Documentation of Numerical Criteria for Acute and Chronic Aquatic Life Protection in the 1989 Water Quality Standards Revisions"*, dated June 1989. Where multiple data points were available the geometric mean was utilized for test data points. Data from different sources was evaluated to determine if concentrations were measured analytically or were based on a formulation and a dilution calculation, with a preference for measured concentrations. However; if only calculated concentrations were available, based on formulated products and calculated concentrations, that data was used in determining the acute and chronic numeric targets (products of LC_{50} and application factor).

For the compound Fipronil EPA contacted the US Department of Agriculture and Louisiana State University (LSU) to obtain information concerning the effects of Fipronil to crayfish, based on complaints of the adverse effects this pesticide was having on crayfish farming. At this time LSU is conducting toxicity tests using crayfish and examining the effects on different life stages and size. Because some of the degradation products of Fipronil are more toxic than the parent compound, establishing a numeric target that considers the toxicity of the parent compound and the degradation products will be difficult and time consuming. For the purpose of this activity, data from the EPA database was used in establishing a numeric target for aquatic life protection.

No calculations were necessary for pesticides that have Louisiana adopted water quality criteria for aquatic life protection or for EPA recommended water quality criteria for the protection of aquatic life. Numeric targets developed for the remaining pesticides were established using the following formulae:

Acute numeric target = (LC_{50}) X 0.1

Chronic numeric target = (LC_{50}) X 0.05

Example Calculation:

Acute numeric target for fipronil = 45.6 µg/l (LC_{50} for *Ceriodaphnia dubia)* X 0.1
= 4.6 µg/l

Chronic numeric target for fipronil = 45.6 µg/l (LC_{50} for *Ceriodaphnia dubia*) X 0.05
= 2.3 µg/l

APPENDIX C: LDAF Pesticide Monitoring Data (2000 & 2001)

* Samples analyzed for Fipronil and Metabolites #46136, #46513 and #45950

Parish, Site # Location	Week of 03-06-00	Week of 03-13-00	Week of 03-20-00	Week of 03-27-00	Week of 04-03-00	Week of 04-10-00	Week of 04-17-00	Week of 04-24-00	Week of 05-01-00	Week of 05-08-00	Week of 05-15-00
Vermilion **IX-01** Noel Canal, SW of Perry	**ND-ALL**	**F: 0.37** **Others: ND**	**F: 0.27** **Others: ND**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**
Acadia **IX-02** Bayou Queue de Tortue & Hwy 342	**F: 2.25** **Others: ND**	**F: 1.71** **Others: ND**	**F: 2.45** **Others: ND**	**F: 1.36** **Others: ND**	**F: 3.01** **Others: ND**	**F: 0.68** **M#46513: 0.23** **Others: ND**	**F: 4.63** **M#46513: 1.96** **M#46136: 0.47** **M#45950: 0.21**	**F: 6.78** **M#46513: 0.88** **M#46136: 0.43** **M#45950: 0.25**	**F: 0.21** **M#46513: 0.21** **M#46136: ND** **M#45950: 0.27**	**ND-ALL**	**ND-ALL**
Acadia **IX-03** Bayou Wikoff, Hwy 98	**ND-ALL**	**F: 4.09** **M#46513: 1.29** **M#46136: 0.33** **M#45950: ND**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**F: 0.46** **M#46513: 0.21** **Others: ND**	**F: 2.37** **M#46513: 0.35** **Others: ND**	**ND-ALL**	**F: 1.22** **M#46513: 0.54** **Others: ND**	**ND-ALL**	**ND-ALL**
Vermilion **IX-04** Avrico Canal - Hwy 712, E. of Gueydan	**ND-ALL**	**ND-ALL**	**ND-ALL**	**F: 1.05** **Others: ND**	**F: 0.49** **M#46513: 0.35** **Others: ND**	**F: 0.62** **Others: ND**	**F: 1.09** **M#46513: 0.68** **Others: ND**	**F: 1.74** **M#46513: 1.46** **M#46136: 0.22** **M#45950: 0.20**	**F: 0.67** **M#46513: 0.69** **M#46136: 0.22** **M#45950: 0.32**	**F: ND** **M#46513: 0.37** **Others: ND**	**ND-ALL**
Acadia **IX-05** Bayou Queue de Tortue & Hwy 91	**ND-ALL**	**ND-ALL**	**F: 1.51** **M#46513: 0.21** **M#46136: ND** **M#45950: ND**	**F: 2.20** **M#46513: 0.32** **Others: ND**	**F: 2.29** **M#46513: 0.34** **Others: ND**	**F: 4.08** **M#46513: 0.78** **M#46136: 0.35** **M#45950: 0.22**	**F: 1.18** **M#46513: 0.26** **Others: ND**	**F: 2.19** **M#46513: 0.54** **M#46136: 0.26** **M#45950: 0.21**	**F: 1.8** **M#46513: 0.53** **M#46136: 0.24** **M#45950: 0.38**	**F: 0.22** **M#46513: 0.21** **Others: ND**	**ND-ALL**
Acadia **IX-06** Bayou Plauemine Brule, Hwy 91	**ND-ALL**	**F: 1.02** **Others: ND**	**F: 2.35** **M#46513: 0.65** **M#46136: 0.24** **M#45950: ND**	**F: 1.34** **M#46513: 0.35** **Others: ND**	**F: 0.26** **Others: ND**	**F: 1.02** **M#46513: 0.33** **Others: ND**	**F: 2.81** **M#46513: 0.75** **Others: ND**	**F: 2.03** **M#46513: 0.55** **Others: ND**	**F: 1.78** **M#46513: 0.65** **Others: ND**	**ND-ALL**	**ND-ALL**
Acadia **IX-07** Bayou Pointe Aux Loups	**ND-ALL**	**F: 0.76** **Others: ND**	**F: 8.41** **M#46513: ND** **M#46136: 0.40** **M#45950: ND**	**F: 0.52** **Others: ND**	**F: 1.81** **Others: ND**	**F: 1.82** **M#46513: 0.25** **Others: ND**	**F: 1.42** **M#46513: 0.30** **Others: ND**	**F: 0.26** **Others: ND**	**F: 3.30** **M#46513: 0.77** **M#46136: 0.32** **M#45950: ND**	**F: 1.46** **M#46513: 0.26** **Others: ND**	**ND-ALL**
Acadia **IX-08** Bayou Nezpique	**ND-ALL**	**ND-ALL**	**ND-ALL**	**F: 2.91** **M#46513: 0.29** **Others: ND**	**F: 3.47** **M#46513: 0.46** **M#46136: 0.25** **M#45950: ND**	**F: 0.52** **Others: ND**	**F: 0.58** **Others: ND**	**F: 0.54** **Others: ND**	**F: 0.62** **Others: ND**	**ND-ALL**	**ND-ALL**

Parish, Site # Location	Week of 03-06-00	Week of 03-13-00	Week of 03-20-00	Week of 03-27-00	Week of 04-03-00	Week of 04-10-00	Week of 04-17-00	Week of 04-24-00	Week of 05-01-00	Week of 05-08-00	Week of 05-15-00
Jeff Davis **IX-09** Mermenteau River in Lake Arthur @ Hwy 14	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**F: 1.76 Others: ND**	**F: 0.90 Others: ND**	**F: 0.62 Others: ND**	**F: 0.65 M#46513: 0.20 Others: ND**	**F: 0.57 Others: ND**	**F: 0.23 Others: ND**	**F: 4.16 M#46513: 1.13 M#46136: 0.31 M#45950: ND**
Jeff Davis, **IX-10** Thornwell Drainage Canal at Hwy 99 & 14	**ND-ALL**	**ND-ALL**	**ND-ALL**	**F: 0.40 M#46513: 0.75 Others: ND**	**F: 4.88 M#46513: 1.09 M#46136: 0.21 M#45950: ND**	**F: 1.95 Others: ND**	**F: 1.00 M#46513: 1.70 M#46136: 0.27 M#45950: 0.26**	**F: 0.31 M#46513: 0.27**	**ND-ALL**	**F: ND M#46513: 0.21 Others: ND**	**F: ND M#46513: 0.20 Others: ND**
Jeff Davis, **IX-11** Bayou Chene at Hwy 99	**ND-ALL**	**ND-ALL**	**ND-ALL**	**F: 3.12 M#46513: 0.73 M#46136: 0.23 M#45950: ND**	**F: 0.88 Others: ND**	**F: 1.93 Others: ND**	**F: 1.37 M#46513: 0.33 Others: ND**	**F: 0.80 Others: ND**	**F: 1.37 M#46513: 0.31 M#46136: ND M#45950: 0.22**	**ND-ALL**	**ND-ALL**
Jeff Davis, **IX-12** West Bayou Lacassine at Hwy 90	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**
Cameron, **IX-15** Mermentau River @ Intracoastal Waterway	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**F: 0.51 Others: ND**	**F: 0.31 Others: ND**	**F: 0.63 M#46513: 0.39**	**F: 0.79 M#46513: 0.46 Others: ND**	**ND-ALL**	**F: 0.28 Others: ND**
Acadia **IXWM-03** Bayou de Cannes - Hwy 98	**ND-ALL**	**ND-ALL**	**F: 1.93 M#46513: 0.43 Others: ND**	**F: 1.95 M#46513: 0.56 Others: ND**	**F: 4.76 M#46513: 1.21 M#46136: 0.38 M#45950: 0.26**	**F: 0.91 M#46513: 0.26 Others: ND**	**F: 2.52 M#46513: 0.53 Others: ND**	**F: 1.98 M#46513: 0.56 M#46136: ND M#45950: 0.21**	**F: 0.76 M#46513: 0.42 M#46136: ND M#45950: 0.21**	**ND-ALL**	ns
Acadia **IXWM-04** Bayou Plaquemine - Hwy 98	**F: 4.88 M#46513: 1.25 M#46136: 0.32 M#45950: ND**	**F: 4.22 M#46513: 1.12 M#46136: 0.50 M#45950: ND**	**F: 0.99 M#46513: 0.23 M#46136: ND M#45950: ND**	**F: 2.43 M#46513: 0.84 M#46136: 0.29 M#45950: ND**	**F: 0.42 Others: ND**	**F: 2.52 M#46513: 0.39 M#46136: 0.27 M#45950: ND**	**F: 0.46 M#46513: 0.30 Others: ND**	**F: 2.31 M#46513: 0.81 M#46136: 0.22 M#45950: ND**	**F: 2.25 M#46513: 0.83 M#46136: 0.23 M#45950: 0.22**	**ND-ALL**	**ND-ALL**
Jeff Davis **IXWM-05** S. side of Hwy 90 on E.Bayou Lacassine, W. Of Welsh	**ND-ALL**	**ND-ALL**	**F: 1.05 Others: ND**	**F: 1.68 M#46513: 0.39 Others: ND**	**F: 0.85 Others: ND**	**F: 4.87 M#46513: 0.33 M#46136: 0.21**	**F: 6.24 M#46513: 0.83 M#46136: 0.44 M#45950: 0.20**	**F: 1.41 M#46513: 0.23 Others: ND**	**ND-ALL**	**ND-ALL**	ns

Parish, Site # Location	Week of 03-06-00	Week of 03-13-00	Week of 03-20-00	Week of 03-27-00	Week of 04-03-00	Week of 04-10-00	Week of 04-17-00	Week of 04-24-00	Week of 05-01-00	Week of 05-08-00	Week of 05-15-00
Acadia **IXWM-06** Mermenteau River at Bridge, Mermentau	**ND-ALL**	**ND-ALL**	**ND-ALL**	**F: 0.56** **Others: ND**	**F: 2.63** **M#46513: 0.32** **M#46136: 0.24** **M#45950: ND**	**F: 0.47** **Others: ND**	**F: 0.62** **Others: ND**	**F: 0.74** **Others: ND**	**F: 0.59** **Others: ND**	**ND-ALL**	**ns**
Jeff Davis **IXWM-07** Bayou Lacassine at Hwy 14	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**F: 1.53** **M#46513: 0.21** **Others: ND**	**F: 0.98** **Others: ND**	**F: 0.46** **Others: ND**	**F: 0.40** **Others: ND**	**F: 0.64** **M#46513: 0.22** **Others: ND**	**ND-ALL**	ns
Acadia **IXWM-08** Bayou Queue de Tortue & Hwy 13	**ND-ALL**	**ND-ALL**	**F: 1.08** **Others: ND**	**F: 1.51** **M#46513: 0.27** **Others: ND**	**F: 4.09** **M#46513: 0.38** **M#46136: 0.44** **M#45950: ND**	**F: 3.60** **M#46513: 1.14** **M#46136: 0.26** **M#45950: ND**	**F: 0.59** **Others: ND**	**F: 0.52** **M#46513: 0.25** **Others: ND**	**F: 0.91** **M#46513: 0.43** **M#46136: 0.26** **M#45950: 0.35**	**ND-ALL**	**ND-ALL**

Parish, Site # Location	Week of 05-22-00	Week of 05-29-00	Week of 06-05-00	Week of 06-12-00	Week of 06-19-00	Week of 06-26-00	Week of 07-05-00	Week of 07-10-00	Week of 07-17-00	Week of 07-24-00	Week of 07-31-00
Vermilion **IX-01** Noel Canal, SW of Perry	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**
Acadia **IX-02** Bayou Queue de Tortue & Hwy 342	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**
Acadia **IX-03** Bayou Wikoff, Hwy 98	**ND-ALL**	**F: 0.34** **Others: ND**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**
Vermilion **IX-04** Avrico Canal - Hwy 712, E. of Gueydan	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**
Acadia **IX-05** Bayou Queue de Tortue & Hwy 91	**ND-ALL**	**F: 0.20** **M#46513: 0.20** **Others: ND**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**		**ND-ALL**	**ND-ALL**	**ND-ALL**
Acadia **IX-06** Bayou Plauemine Brule, Hwy 91	**F: 0.27** **Others: ND**	**M#46513: 0.21** **Others: ND**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**
Acadia **IX-07** Bayou Pointe Aux Loups	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**
Acadia **IX-08** Bayou Nezpique	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**
Jeff Davis **IX-09** Mermenteau River in Lake Arthur @ Hwy 14	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**
Parish, Site #, Location	**Week of 05-22-00**	**Week of 05-29-00**	**Week of 06-05-00**	**Week of 06-12-00**	**Week of 06-19-00**	**Week of 06-26-00**	**Week of 07-05-00**	**Week of 07-10-00**	**Week of 07-17-00**	**Week of 07-24-00**	**Week of 07-31-00**

Jeff Davis, **IX-10** Thornwell Drainage Canal at Hwy 99 & 14	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**
Jeff Davis, **IX-11** Bayou Chene at Hwy 99	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**
Jeff Davis, **IX-12** West Bayou Lacassine at Hwy 90	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**
Cameron, **IX-15** Mermentau River @ Intracoastal Waterway	**F: 0.27** **M#46513: 0.33** **Others: ND**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**F: ND** **M#46513: 0.27**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**
Acadia **IXWM-03** Bayou de Cannes - Hwy 98	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**
Acadia **IXWM-04** Bayou Plaquemine - Hwy 98	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**
Jeff Davis **IXWM-05** S. side of Hwy 90 on E.Bayou Lacassine, W. Of Welsh	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**
Acadia **IXWM-06** Mermenteau River at Bridge, Mermentau	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**
Jeff Davis **IXWM-07** Bayou Lacassine at Hwy 14	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**
Acadia **IXWM-08** Bayou Queue de Tortue & Hwy 13	**F: 1.52** **M#46513: 0.29** **Others: ND**	**F: 0.72** **M#46513: 0.27** **Others: ND**	**F: 0.64** **M#46513: 0.34** **M#46136: ND** **M#45950: 0.27**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**	**ND-ALL**

* Samples analyzed for Fipronil and Metabolites #46136, #46513 and #45950

Parish, Site # Location	Week of 03-08-01	Week of 03-15-01	Week of 03-21-01	Week of 03-28-01	Week of 04-02-01	Week of 04-09-01	Week of 04-16-01	Week of 04-23-01	Week of 04-30-01	Week of 05-07-01	Week of 05-14-01
Vermilion **IX-04** Avrico Canal - Hwy 712, E. of Gueydan	**ND**	**ND**	**ND**	**ND**	**F: 0.52 Others: ND**	**ND**	**F: 0.21 Others: ND**	**F: 0.25 Others: ND**	**ND**	**ND**	**ND**
Acadia **IX-05** Bayou Queue de Tortue & Hwy 91	**ND**	**ND**	**ND**	**F: 0.46 Others: ND**	**F: 0.61 Others: ND**	**F: 1.04 Others: ND**	**F: 2.19 Others: ND**	**F: 0.41 Others: ND**	**ND**	**ND**	**ND**
Acadia **IX-06** Bayou Plauemine Brule, Hwy 91	**ND**	**ND**	**ND**	**F: 0.21 Others: ND**	**F: 0.82 Others: ND**	**F: 1.06 Others: ND**	**F: 0.30 Others: ND**	**F: 0.66 Others: ND**	**F: 0.76 M#46513: 0.24 Others: ND**	**F: 0.94 M#46513: 0.37 Others: ND**	**ND**
Acadia **IX-08** Bayou Nezpique	**ND**	**ND**	**ND**	**ND**	**F: 0.26 Others: ND**	**F: 0.58 Others: ND**	**F: 1.15 Others: ND**	**F: 1.44 Others: ND**	**F: 1.18 Others: ND**	**F: 0.97 Others: ND**	**F: 1.17 M#46513: 0.87 M#46136: ND M#45950: 0.46**
Jeff Davis, **IX-11** Bayou Chene at Hwy 99	**ND**	**ND**	**ND**	**F: 0.29 Others: ND**	**F: 2.38 Others: ND**	**F: 2.12 Others: ND**	**F: 0.69 Others: ND**	**F: 1.57 Others: ND**	**F: 0.86 Others: ND**	**ND**	**F: 0.28 Others: ND**
Cameron, **IX-15** Mermentau River @ Intracoastal Waterway	**ND**	**ND**	**ND**	**ND**	**F: 0.41 Others: ND**	**ND**	**ND**	**ND**	**ND**	**F: 0.27 Others: ND**	**F: 0.24 Others: ND**
Acadia **IXWM-04** Bayou Plaquemine - Hwy 98	**ND**	**ND**	**F: 2.15 M#46513: 0.51 M#46136: 0.23 M#45950: ND**	**F: 0.60 Others: ND**	**F: 1.21 Others: ND**	**F: 1.36 M#46513: 0.51 Others: ND**	**F: 2.83 M#46513: 0.66 M#46136: 0.21 M#45950: ND**	**ND**	**ND**	**ND**	
Jeff Davis **IXWM-05** S. side of Hwy 90 on E.Bayou Lacassine, W. Of Welsh	**ND**	**ND**	**ND**	**ND**	**ND**	**F: 5.17 M#46513: 0.40 M#46136: 0.20 M#45950: ND**	**F: 1.85 Others: ND**	**ND**	**F: 1.05 Others: ND**	**F: 0.31 Others: ND**	

Parish, Site # Location	Week of 03-08-01	Week of 03-15-01	Week of 03-21-01	Week of 03-28-01	Week of 04-02-01	Week of 04-09-01	Week of 04-16-01	Week of 04-23-01	Week of 04-30-01	Week of 05-07-01	Week of 05-14-01
Acadia **IXWM-06** Mermenteau River at Bridge, Mermentau	**ND**	**ND**	**ND**	**F: 0.39** **Others: ND**	**F: 0.34** **Others: ND**	**F: 0.40** **Others: ND**	**F: 0.66** **Others: ND**	**F: 0.71** **Others: ND**	**F: 0.84** **Others: ND**	**F: 0.70** **Others: ND**	
Jeff Davis **IXWM-07** Bayou Lacassine at Hwy 14	**ND**	**ND**	**F: 0.45** **Others: ND**	**F: 0.31** **Others: ND**	**F: 0.24** **Others: ND**	**F: 1.54** **Others: ND**	**F: 0.71** **Others: ND**	**F: 0.55** **Others: ND**	**F: 0.56** **Others: ND**	**ND**	
Acadia **IXWM-08** Bayou Queue de Tortue & Hwy 13	**ND**	**ND**	**ND**	**ND**	**F: 0.94** **Others: ND**	**F: 2.66** **Others: ND**	**F: 1.37** **M#46513: 0.25** **Others: ND**	**ND**	**F: 0.60** **Others: ND**	**ND**	
Vermilion Big 4 Canal @ Hwy 14	★★	★★	★★	★★	★★	★★	**ND**	**ND**	**ND**	**ND**	**ND**

★★ = No Sample taken ND = non detect

Parish, Site # Location	Week of 05-21-01	Week of 05-28-01	Week of 06-04-01	Week of 06-11-01	Week of 06-18-01	Week of 06-25-01
Vermilion **IX-04** Avrico Canal - Hwy 712, E. of Gueydan		**ND**	**ND**	**ND**	**ND**	**ND**
Acadia **IX-05** Bayou Queue de Tortue & Hwy 91	**F: 0.29 Others: ND**	**F: 0.61 Others: ND**	**ND**	**ND**	**ND**	**ND**
Acadia **IX-06** Bayou Plauemine Brule, Hwy 91	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Acadia **IX-08** Bayou Nezpique	**F: 0.39 M#46513: 0.22 Others: ND**	**F: 0.69 M#46513: 0.40 Others: ND**	**F: 0.85 M#46513: 0.25 M#46136: ND M#45950: 0.25**	**ND**	**ND**	**ND**
Jeff Davis, **IX-11** Bayou Chene at Hwy 99	**F: 0.41 M#46513: 0.20 Others: ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Cameron, **IX-15** Mermentau River @ Intracoastal Waterway	**ND**	**ND**	**F: 0.27 Others: ND**	**ND**	**ND**	**ND**
Acadia **IXWM-04** Bayou Plaquemine - Hwy 98	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Jeff Davis **IXWM-05** S. side of Hwy 90 on E.Bayou Lacassine, W. Of Welsh	**F: ND M#46513: 0.24 Others: ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Vermilion Big 4 Canal @ Hwy 14	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**

Parish, Site # Location	Week of 05-21-01	Week of 05-28-01	Week of 06-04-01	Week of 06-11-01	Week of 06-18-01	Week of 06-25-01
Acadia **IXWM-06** Mermenteau River at Bridge, Mermentau	**F: 0.54 M#46513: 0.28 Others: ND**	**F: 0.98 M#46513: 0.38 Others: ND**	**ND**	**ND**	**ND**	**ND**
Jeff Davis **IXWM-07** Bayou Lacassine at Hwy 14	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Acadia **IXWM-08** Bayou Queue de Tortue & Hwy 13	**F: 0.57 M#46513: 0.33 Others: ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Vermilion Big 4 Canal @ Hwy 14	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**

ND = non detect

APPENDIX D: Summary Review of LDAF Fipronil Monitoring Data (2000 and 2001)

Parish	Site #	Station Name	Wkly Mar - Aug 2000	Wkly Mar - Jun 2001	Exceed. Per # of samples	% Exceed.	Rating
Acadia	IXWM-04	Bayou Plaquemine @ Hwy 98	4.88 4.22 2.43 2.52 2.31	2.83	6/37	16%	NS
Acadia	IX-02	Bayou Queue de Tortue @ Hwy 342	2.45 3.01 4.63 6.78		4/24	17%	NS
Acadia	IXWM-08	Bayou Queue de Tortue @ Hwy 13	4.09 3.60	2.66	3/39	8%	PS
Acadia	IXWM-03	Bayou de Cannes @ Hwy 98	4.76 2.52		2/21	10%	PS
Jeff Davis	IXWM-05	S. side of Hwy 90 on E. Bayou Lacassine, W. of Welsh	4.87 6.24		2/21	10%	PS
Acadia	IX-08	Bayou Nezpique	2.91 3.47		2/22	9%	PS
Acadia	IX-03	Bayou Wikoff @ Hwy 98	4.09 2.37		2/24	8%	PS
Acadia	IX-06	Bayou Plaquemine Brule @ Hwy 91	2.35 2.81		2/24	8%	PS
Jeff Davis	IX-11	Bayou Chene @ Hwy 99	3.12	2.38	2/39	5%	PS
Acadia	IXWM-06	Mermentau River @ Bridge, Mermentau	2.63		1/21	5%	FS
Jeff Davis	IX-09	Mermentau River in Lake Arthur @ Hwy 14	4.16		1/22	5%	FS
Jeff Davis	IX-10	Thornwell Drainage Canal @ Hwy 99 & 14	4.88		1/22	5%	FS
Acadia	IX-05	Bayou Queue de Tortue @ Hwy 91	4.08		1/23	4%	FS
Acadia	IX-07	Bayou Pointe Aux Loups	8.41		1/23	4%	FS

FS = Fully Supporting PS = Partially Supporting NS = not Supporting
Greyed cells = not sampled in 2001